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(54) LIQUID LUBRICANT, LUBRICATING OIL COMPOSITION, AND BEARING OIL

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a liquid lubricant which has a high flash point in spite of having a low viscosity and has low evaporability and excellent heat resistance, to provide a lubricant composition, and to provide an oil for a sintered oil-impregnated bearing or an oil for a fluid bearing.

SOLUTION: The liquid lubricant comprises 21-29C hydrocarbons and has a kinematic viscosity (40° C) of 6-16 mm²/s, a kinematic viscosity (100° C) of 4.9 mm²/s or lower, a flash point of 180° C or higher, and a pour point of -15° C or lower. The lubricant composition is prepared by adding (B) at least one additive selected from among an antioxidant, a friction modifier, a dispersant, a corrosion inhibitor, a metal inactivator, a defoaming agent, a viscosity index improver, and a thickener to (A) the liquid lubricant. The sintered oil-impregnated bearing oil or the fluid bearing oil comprises the liquid lubricant or the lubricant composition.

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CLAIMS

[Claim(s)]

[Claim 1]

The fluid lubrication agent 180 degrees C or more and whose pour point it consists of a hydrocarbon of carbon numbers 21-29, and below 4.9mm² / s, and the flash point are [the kinematic viscosity in 40 degrees C] -15 degrees C or less for 6-16mm² / s, and the kinematic viscosity in 100 degrees C.

[Claim 2]

The fluid lubrication agent according to claim 1 said whose flash point is 200 degrees C or more.

[Claim 3]

The fluid lubrication agent according to claim 1 said whose pour point is -35 degrees C or less.

[Claim 4]

The fluid lubrication agent according to claim 1 said whose hydrocarbon is the oligomer more than at least one kind of dimer chosen from 1-alkenes of carbon numbers 4-24.

[Claim 5]

The fluid lubrication agent according to claim 1 80 degrees C under a thin film and whose evaporation of 96 hours after are below 12 mass %s.

[Claim 6]

(A) The lubricant constituent with which it consists of a hydrocarbon of carbon numbers 21-29, and 6-16mm² / s, and the kinematic viscosity in 100 degrees C come at least for the kinematic viscosity in 40 degrees C to blend a kind of additive chosen as the fluid lubrication agent 180 degrees C or more and whose pour point the flash point is -15 degrees C or less from the (B) antioxidant, a friction regulator, a dispersant, a rust-proofer, a metal deactivator, a defoaming agent, a viscosity index improver, and a thickening agent below 4.9mm² / s.

[Claim 7]

(A) The lubricant constituent according to claim 6 whose hydrocarbon of a component is the oligomer more than at least one kind of dimer chosen from 1-alkenes of carbon numbers 4-24.

[Claim 8]

(B) The lubricant constituent according to claim 6 with which the antioxidant of a component consists of an amine system antioxidant.

[Claim 9]

(B) The lubricant constituent according to claim 6 with which the friction regulator of a component consists of an amine salt of phosphoric ester and/or phosphoric ester.

[Claim 10]

(B) The lubricant constituent according to claim 6 with which the thickening agent of a component consists of metal soap.

[Claim 11]

The lubricant constituent according to claim 6 whose kinematic viscosity in 40 degrees C is 6-16mm² / s.

[Claim 12]

The lubricant constituent according to claim 6 whose flash point is 200 degrees C or more.

[Claim 13]

The lubricant constituent according to claim 6 whose pour point is -35 degrees C or less.
[Claim 14]

The lubricant constituent according to claim 6 80 degrees C under a thin film and whose evaporation of 96 hours after are below 12 mass %s.

[Claim 15]

The oil impregnated sintered bearing oil or liquid bearing oil which consists of a fluid lubrication agent according to claim 1 to 5.

[Claim 16]

The oil impregnated sintered bearing oil or liquid bearing oil which consists of a lubricant constituent according to claim 6 to 14.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

About a fluid lubrication agent, a lubricating oil constituent, and a bearing oil, it has the high flash point and especially this invention cannot evaporate easily, though it is hypoviscosity, and it relates to the fluid lubrication agent which is excellent in thermal resistance, a lubricant constituent, and a bearing oil.

[0002]

[Description of the Prior Art]

The spindle motor used for an electrical machinery and apparatus especially CD, DVD and HDD, a polygon scanner, etc. is accelerated every year, and current requires high-speed rotation of 10000 or more rpm increasingly.

Although anti-friction bearing represented by the ball bearing has been conventionally used for these spindle motors, the dynamic pressure liquid bearing of a non-contact mold and the oil impregnated sintered bearing of low cost are increasingly used from the engine performance and a cost side. The engine performance at the time of high-speed rotation of these dynamic pressure liquid bearing and an oil impregnated sintered bearing (mainly running torque) becomes settled with the viscosity of the lubricant used in many cases, and the running torque at the time of high-speed rotation tends to become low, so that it is hypoviscosity.

On the other hand, once these lubricant is enclosed with a bearing device, in order to have to maintain whole life lubricity in the condition that there is no supply, the evaporation loss of lubricant and decomposition loss must be avoided as much as possible.

It is difficult for an evaporation loss to also increase from hydrocarbon-group oil represented by usual mineral oil, if it hypoviscosity-izes (low molecular weight), and to be compatible in hypoviscosity-izing and low evaporation-ization. Moreover, aiming at this coexistence, the technique using the ester which is a polar compound is indicated by base oil (JP,11-172267,A, JP,2001-240885,A, JP,2002-146374,A, etc.).

[0003]

However, if a polar substance like ester is used, deformation and the fault of making it discolor will generate components, such as cladding materials, such as various resin material, for example, CD, and a DVD disk, and a motor frame. For CD and DVD which record especially with a lightwave signal, covering resin must bloom cloudy optically or must avoid deforming as much as possible.

Since it is such, the ester system oils which are excellent as a property also have the environment which cannot carry out real use. On the other hand, vaporization is lower than the former to mineral oil in the motor vessel which uses many CDs, DVDs, and resin material, and the lubricant which made base oil the Polly alpha olefin which is excellent in thermal resistance has been used for it.

However, since it corresponds to improvement in the speed of a motor, hypoviscosity-ization of base oil accelerates and that whose kinematic viscosity in 40 degrees C is 10mm² / s grade is increasingly called for at the present in recent years. The Polly alpha olefin marketed as base oil

is the oligomer of 1-decene and viscosity is decided by the polymerization degree. Kinematic viscosity [in / in the Polly alpha olefin of a dimer with the lowest polymerization degree / 40 degrees C] is about 5mm² / s, and kinematic viscosity [in / in the Polly alpha olefin of the trimer on it / 40 degrees C] is about 17mm² / s. Therefore, if it is going to prepare the fluid lubrication agent whose kinematic viscosity in 40 degrees C is 10mm² / s, it will become the blend with 5mm² / s, and 17mm² / s inevitably. In this case, although target kinematic viscosity is attained, since the Polly alpha olefin of a dimer tends to have evaporated, there was a problem that the amount of loss of lubricant increased as compared with the mineral oil of this viscosity.

[0004]

[Problem(s) to be Solved by the Invention]

This invention was made in order to solve the aforementioned technical problem, though it is hypoviscosity, it has the high flash point and it cannot evaporate easily, and it aims at offering the fluid lubrication agent which is excellent in thermal resistance, a lubricant constituent and an oil impregnated sintered bearing oil, or a liquid bearing oil.

[0005]

[Means for Solving the Problem]

In order to attain said purpose, as a result of repeating research wholeheartedly, this invention persons are setting the raw material of the Polly alpha olefin not only to 1-decene (C(carbon number) 10) but to C12 (1-dodecen) and C14 (1-tetra-decene), and carrying out the polymerization of these, and realized the middle molecular weight and the middle viscosity fluid of lubricant of a commercial item. Header this invention is completed for the ability of the oil impregnated sintered bearing oil or liquid bearing oil using the lubricant constituent and it which are excellent in hypoviscosity, low vaporization, thermal resistance, and lubricity to be offered by excelling mineral oil in vaporization and thermal resistance, and being able to offer the fluid lubrication agent of hypoviscosity with few evaporation losses than the blend preparation liquid of a commercial item (1-decene oligomer) by this, and blending various additives by making this lubricant into base oil further.

[0006]

Namely, this invention,

The fluid lubrication agent 180 degrees C or more and whose pour point it consists of a hydrocarbon of carbon numbers 21-29, and below 4.9mm² / s, and the flash point are [the kinematic viscosity in 40 degrees C] -15 degrees C or less for 6-16mm² / s, and the kinematic viscosity in 100 degrees C,

(A) In the lubricant constituent and list in which it becomes from the hydrocarbon of carbon numbers 21-29, and the kinematic viscosity in 40 degrees C comes at least to blend a kind of additive chosen as the fluid lubrication agent 180 degrees C or more and whose pour point 4.9 or less and the flash point are -15 degrees C or less for 6-16mm² / s, and the kinematic viscosity in 100 degrees C from the (B) antioxidant, a friction regulator, a dispersant, a rust-proofer, a metal deactivator, a defoaming agent, a viscosity index improver, and a thickening agent

The oil impregnated sintered bearing oil or liquid bearing oil which consists of said fluid lubrication agent or said lubricant constituent is offered.

[0007]

[Embodiment of the Invention]

The fluid lubrication agent of this invention consists of a hydrocarbon of carbon numbers 21-29, and, for 6-16mm² / s, and the kinematic viscosity in 100 degrees C, the flash point is [the kinematic viscosity in 40 degrees C / 180 degrees C or more and the pour point] -15 degrees C or less below 4.9mm² / s.

It is desirable in it being the oligomer more than at least one kind of dimer chosen from 1-alkenes of carbon numbers 4-24 as a hydrocarbon of said carbon numbers 21-29 in the fluid lubrication agent of this invention, and it is desirable especially when chosen out of 1-alkenes of carbon numbers 12-14.

As 1-alkenes, for example 1-butene, 1-pentene, 1-hexene, 1-heptene, 1-octene, 1-nonene, 1-decene, 1-dodecen, 1-tetra-decene, 1-hexa decene, 1-heptadecene, 1-octadecene, 1-nonadecen, 1-ray Kosen, 1-HENEIKosen, 1-DOKosen, 1-TORIKosen, 1-tetra-Kosen, 1-

pen TAKOSEN, 1-hexa KOSEN, 1-hepta-KOSEN, 1-OKUTAKOSEN, 1-octa KOSEN, etc. are mentioned. Also in these 1-dodecen and 1-tetra-decene are especially desirable.

[0008]

The kinematic viscosity in 40 degrees C is below $4.9\text{mm}^2/\text{s}$, and has [the fluid lubrication agent of this invention / $6\text{--}16\text{mm}^2/\text{s}$, and the kinematic viscosity in 100 degrees C / the kinematic viscosity in 40 degrees C] $10\text{--}14\text{mm}^2/\text{s}$, and the desirable kinematic viscosity in 100 degrees C in their being below $4\text{mm}^2/\text{s}$. The fluid lubrication agent of this invention is because it aims at considering as hypoviscosity.

The fluid lubrication agent of this invention is desirable in the flash point being 180 degrees C or more, and it being 200 degrees C or more. The flash point is because it is inferior to vaporization or thermal resistance in it being less than 180 degrees C.

The fluid lubrication agent of this invention is desirable in the pour point being -15 degrees C or less, and it being -35 degrees C or less. If the pour point exceeds -15 degrees C, the viscous drag at the time of low temperature will have a bad influence on increase, and the startability of a motor and actuation.

80 degrees C under a thin film and the evaporation of 96 hours after are desirable in it being below 12 mass %, and that of the fluid lubrication agent of this invention are still more desirable in it being below 4 mass %.

[0009]

The lubricant constituent of this invention comes at least to blend a kind of additive chosen as the (A) aforementioned fluid lubrication agent from the (B) antioxidant, a friction regulator, a dispersant, a rust-proofer, a metal deactivator, a defoaming agent, a viscosity index improver, and a thickening agent.

[0010]

(A) The component is the same as that of the fluid lubrication agent of this invention mentioned above.

(B) As an antioxidant of a component, an amine system antioxidant, a phenolic antioxidant, a sulfur system compound, etc. are mentioned.

As an amine system anti-oxidant, for example A mono-octyl diphenylamine, Monoalkyl diphenylamine systems, such as a mono-nonyl diphenylamine, - dibutyl diphenylamine, and 4 and 4'-4,4'-dipentyl diphenylamine, A 4 and 4'-dihexyl diphenylamine, 4,4'-diheptyl diphenylamine, Dialkyl diphenylamine systems, such as - dioctyl diphenylamine, and 4 and 4'-4,4'-dinonylphenylamine, A tetrabutyl diphenylamine, a tetra-hexyl diphenylamine, The poly alkyl diphenylamine systems, such as a tetra-octyl diphenylamine and a tetra-nonyl diphenylamine, alpha-naphthylamine, a phenyl-alpha-naphthylamine, a buthylphenyl-alpha-naphthylamine, A pentyl phenyl-alpha-naphthylamine, a hexyl phenyl-alpha-naphthylamine, Naphthylamine systems, such as a heptyl phenyl-alpha-naphthylamine, an octyl phenyl-alpha-naphthylamine, and a nonylphenyl-alpha-naphthylamine, can be mentioned, and the thing of a dialkyl diphenylamine system is desirable especially. The above-mentioned amine system antioxidant may be used combining a kind or two sorts or more.

[0011]

As a phenolic antioxidant, diphenol systems, such as - methylenebis (2, 6-G tert-butylphenol), and mono-phenol system [, such as 2, 6-G tert-butyl-4-methyl phenol, 2, 6-G tert-butyl-4-ethylphenol 2 and 6-G tert-butyl-p-cresol,], 4, and 4'-2, 2'-methylenebis (4-ethyl-6-tert-butylphenol), can be mentioned, for example. The above-mentioned phenolic antioxidant may be used combining a kind or two sorts or more.

As a sulfur system compound, phenothiazin, pentaerythritol-tetrakis - (3-laurylthio propionate), A screw (3, 5-tert-butyl-4-hydroxybenzyl) sulfide, A thio diethylene screw (3- (3, 5-G tert-butyl-4-hydroxyphenyl)) propionate, 2, and 6-G tert-butyl-4-(4, 6-screw (octylthio)-1,3,5-triazine-2-methylamino) phenol etc. is mentioned.

The desirable loadings of these antioxidants are the range of 0.01 - 10 mass % on constituent whole-quantity criteria, and especially its range of 0.03 - 5 mass % is desirable.

[0012]

(B) As an oily agent of a component, aliphatic series saturation, partial saturation monocarboxylic

acid amides, etc., such as aromatic series saturation, such as aliphatic series saturation, such as hydroxyfatty acid, such as polymerization fatty acids, such as aliphatic series saturation, such as stearin acid and oleic acid, and partial saturation monocarboxylic acid, dimer acid, and hydrogenation dimer acid, ricinoleic acid, and 12-hydroxy stearin acid, lauryl alcohol, and oleyl alcohol, and partial saturation monoalcohol, a stearyl amine, and an oleyl amine, and partial saturation monoamine, a lauric-acid amide, and oleic amide, are mentioned.

The desirable loadings of these oiliness agent are the range of 0.01 – 10 mass % on constituent whole-quantity criteria, and especially its range of 0.1 – 5 mass % is desirable.

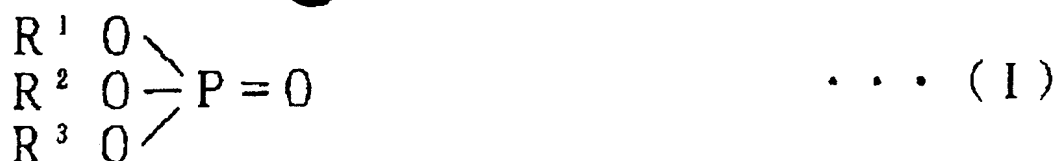
[0013]

(B) What is generally used as an oily agent or an extreme pressure agent can be used for the friction regulator of a component, and the amine salt and sulfur system extreme pressure agent of phosphoric ester and phosphoric ester are mentioned especially.

As phosphoric ester, the phosphoric ester and alkyl acid phosphate which are expressed with following general formula (I) – (V), phosphite, and acid phosphite are included.

[0014]

[Formula 1]



[0015]

The above-mentioned general formula (I) It sets to - (V) and is R1 -R3. The alkyl group, the alkenyl radical, alkyl aryl radical, and arylated alkyl radical of carbon numbers 4-30 are shown, and it is R1 -R3. You may differ, even if the same.

As phosphoric ester, thoria reel phosphate, trialkyl phosphate, Trialkyl aryl phosphate, thoria reel alkyl phosphate, There is trialkenyl phosphate etc. For example, triphenyl phosphate, Tricresyl phosphate, benzyl diphenyl phosphate, ethyl diphenyl phosphate, Tributyl phosphate, ethyl dibutyl phosphate, cresyl diphenyl phosphate, Dicresyl phenyl phosphate, ethyl phenyl diphenyl phosphate, Diethyl phenyl phenyl phosphate, propyl phenyl diphenyl phosphate, Dipropyl phenyl phenyl phosphate, triethyl phenyl phosphate, TORIPURO pill phenyl phosphate, buthylphenyl diphenyl phosphate, Dibutyl phenyl phenyl phosphate, tributyl phenyl phosphate, Trihexyl phosphate, Tori (2-ethylhexyl) phosphate, Tridecyl phosphate, trilauryl phosphate, TORIMIRISU chill phosphate, tripalmityl phosphate, tris TEARIRU phosphate, trio rail phosphate, etc. can be

mentioned.

[0016]

As alkyl acid phosphate, 2-ethylhexyl acid phosphate, ethyl acid phosphate, butyl acid phosphate, oleyl acid phosphate, tetra-KOSHIRU acid phosphate, isodecylacidphosphate, lauryl acid phosphate, tridecyl acid phosphate, stearyl acid phosphate, isostearylacidphosphate, etc. can be mentioned, for example.

[0017]

As phosphite, triethyl phosphite, tributyl phosphite, triphenyl phosphite, tricresyl phosphite, Tori (nonylphenyl) phosphite, Tori (2-ethylhexyl) phosphite, tridecyl phosphite, trilauryl phosphite, tri-iso-octyl phosphite, diphenyl isodecyl phosphite, tristearylphosphite, trioylel phosphite, etc. can be mentioned, for example.

[0018]

As acid phosphite, dibutyl hydrogen phosphite, dilauryl hydrogen phosphite, dioleyl hydrogen phosphite, distearyl hydrogen phosphite, diphenyl hydrogen phosphite, etc. can be mentioned, for example. In the above phosphoric ester, tricresyl phosphate and triphenyl phosphate are suitable.

[0019]

Furthermore, as amines which form these and an amine salt, it is a general formula (VI), for example.

R_4nNH_{3-n} ... (VI)

(R₄ shows the alkyl group of carbon numbers 3-30 or an alkenyl radical, the aryl group of carbon numbers 6-30, an arylated alkyl radical, or the hydroxyalkyl radical of carbon numbers 2-30 among a formula, and n shows 1, 2, or 3.) Moreover, R₄ When there are more than one, it is two or more R₄. Even if the same, you may differ.

It comes out and the mono-permutation amine, JI permutation amine, or the Tori permutation amine expressed is mentioned. R₄ in the above-mentioned general formula (VI) Inner alkyl groups or alkenyl radicals of carbon numbers 3-30 may be the shape of a straight chain, a letter of branching, and annular any.

[0020]

As an example of a mono-permutation amine, a butylamine, pentylamine, hexylamine, Cyclohexylamine, an octyl amine, a lauryl amine, a stearyl amine, an oleyl amine, benzylamine, etc. can be mentioned. As an example of a JI permutation amine Dibutyl amine, dipentylamine, a dihexyl amine, dicyclohexylamine, A dioctyl amine, a dilauryl amine, a distearyl amine, a dioleoyl amine, Dibenzylamine, stearyl monoethanolamine, DESHIRU monoethanolamine, Hexyl mono-propanolamine, benzyl monoethanolamine, Phenyl monoethanolamine, tolyl mono-propanol, etc. can be mentioned. As an example of the Tori permutation amine Tributylamine, tripentylamine, trihexyl amine, tricyclo hexylamine, Trioctylamine, trilaurylamine, TORISUTE allylamine, A trio rail amine, tribenzylamine, dioleoyl monoethanolamine, Dilauryl mono-propanolamine, dioctyl monoethanolamine, Dihexyl mono-propanolamine, dibutyl mono-propanolamine, Oleyl diethanolamine, stearyl dipropanolamine, Lauryl diethanolamine, octyl dipropanolamine, Butyl diethanolamine, benzyl diethanolamine, phenyl diethanolamine, tolyl dipropanolamine, xylol diethanolamine, triethanolamine, tripropanolamine, etc. can be mentioned.

[0021]

What is necessary is to have a sulfur atom in intramolecular, to distribute to lubricating oil base oil as a sulfur system extreme pressure agent, at the dissolution or homogeneity, and just to be able to demonstrate an extreme pressure property and the outstanding friction property. As such a thing, sulfurized oil fat, a sulfuration fatty acid, sulfuration ester, a sulfuration olefin, dihydrocull BIRUPORISARUFAIDO, a thiadiazole compound, thiophosphoric acid ester (a thio FOSU fight, thio phosphate), an alkylthio carbamoyl compound, a thio carver mate compound, a thio terpene compound, a dialkyl thiodipropionate compound, etc. can be mentioned, for example. Although sulfurized oil fat makes sulfur, a sulfur content compound, and fats and oils (lard oil, whale oil, vegetable oil, fish oil, etc.) react, it is obtained here and especially a limit does not have the sulfur content, generally the thing of 5 - 30 mass % is suitable. As the example, sulfuration lard, sulfuration rapeseed oil, sulfuration castor oil, sulfuration soybean oil, sulfuration rice bran

oil, etc. can be mentioned. Sulfuration oleic acid etc. can be mentioned as an example of a sulfuration fatty acid, and sulfuration methyl oleate, sulfuration rice bran fatty-acid octyl, etc. can be mentioned as an example of sulfuration ester.

[0022]

As a sulfuration olefin, it is the following general formula (VII), for example.

R5-Sa-R6 ... (VII)

(R5 shows the alkenyl radical of carbon numbers 2-15 among a formula, R6 shows the alkyl group or alkenyl radical of carbon numbers 2-15, and a shows the integer of 1-8.)

It can come out and the compound expressed can be mentioned. This compound is obtained by making the olefin of carbon numbers 2-15, or that 2 - a tetramer react with sulfidizing agents, such as sulfur and a sulfur chloride, and a propylene, isobutene, its JIISO butene, etc. are desirable as this olefin.

[0023]

As dihydrocull BIRUPORISARUFAIDO, it is the following general formula (VIII).

R7-Sb-R8 ... (VIII)

(R7 and R8 show the aryl group of the alkyl group of carbon numbers 1-20 or an annular alkyl group, and carbon numbers 6-20, the alkyl aryl radical of carbon numbers 7-20, or the arylated alkyl radical of carbon numbers 7-20 among a formula, respectively, even if they are mutually the same, you may differ, and b shows the integer of 1-8.)

It is the compound come out of and expressed. Here, it is R7. And R8 It is called an alkyl sulfide when it is an alkyl group.

[0024]

R7 in the above-mentioned general formula (VIII) And R8 A methyl group, an ethyl group, n-propyl group, an isopropyl group, n-butyl, an isobutyl radical, sec-butyl, tert-butyl, various pentyl radicals, various hexyl groups, various heptyl radicals, various octyl radicals, various nonyl radicals, various decyl groups, various dodecyl, a cyclohexyl radical, a cyclo octyl radical, a phenyl group, a naphthyl group, a tolyl group, a xylyl group, benzyl, a phenethyl radical, etc. can be mentioned.

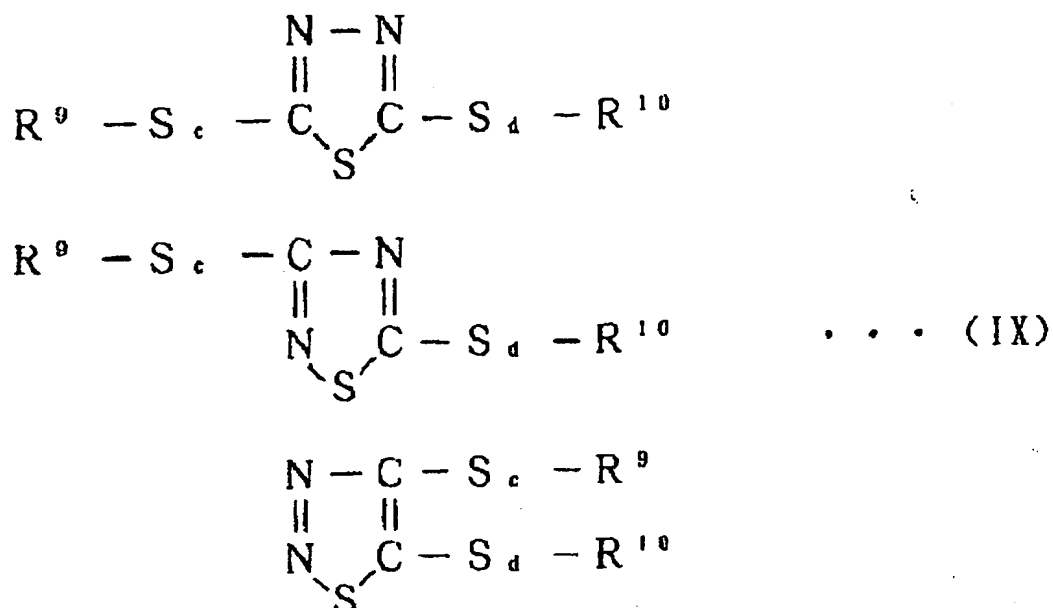
[0025]

As this dihydrocull BIRUPORISARUFAIDO, dibenzyl polysulfide, various dinonyl polysulfide, various didodecyl polysulfide, various dibutyl polysulfide, various dioctyl polysulfide, diphenyl polysulfide, dicyclohexyl polysulfide, etc. can be mentioned preferably, for example.

[0026]

As a thiadiazole compound, it is the following general formula (IX), for example.

[Formula 2]



[0027]

(R9 and R10 show a hydrogen atom and the hydrocarbon group of carbon numbers 1-20 among a formula, respectively, and c and d show the integer of 0-8, respectively.)

It comes out and 1 expressed, 3, 4-thiadiazole, 1 and 2, 4-thiadiazole compound, 1 and 4, 5-thiadiazole, etc. are used preferably.

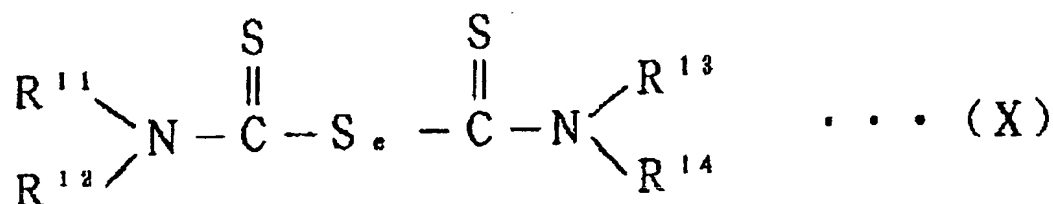
As this thiadiazole compound, it is 2 and 5-screw (n-hexyl dithio), for example. - 1, 3, 4-thiadiazole, 2, 5-screw (n-octyl dithio) - 1, 3, 4-thiadiazole, 2, 5-screw (n-nonyl dithio) - 1, 3, 4-thiadiazole, 2, 5-screw (1, 1, 3, 3, - tetramethylbutyl dithio) - 1, 3, 4-thiadiazole, 3, 5-screw (n-hexyl dithio) - 1, 2, 4-thiadiazole, 3, 5-screw (n-octyl dithio) - 1, 2, 4-thiadiazole, 3, 5-screw (n-nonyl dithio) - 1, 2, 4-thiadiazole, 3, 5-screw (1, 1, 3, 3, - tetramethylbutyl dithio) - 1, 2, 4-thiadiazole, 4, 5-screw (n-hexyl dithio) - 1, 2, 3-thiadiazole, 4, 5-screw (n-octyl dithio) - 1, 2, 3-thiadiazole, 4, 5-screw (n-nonyl dithio) - 1, 2, 3-thiadiazole, 4, 5-screw (1, 1, 3, 3, - tetramethylbutyl dithio) - 1, 2, and 3-thiadiazole etc. can be mentioned preferably.

[0028]

As thiophosphoric acid ester, an alkyl TORICHIOFOSU fight, aryl or alkyl aryl thio phosphate, dilauryl dithiophosphate zinc, etc. are mentioned, and a lauryl TORICHIOFOSU fight and triphenyl thio phosphate are especially desirable.

As an alkylthio carbamoyl compound, it is the following general formula (X), for example.

[Formula 3]



[0029]

(R11-R14 show the alkyl group of carbon numbers 1-20 among a formula, respectively, and e

shows the integer of 1-8.)

As this alkylthio carbamoyl compound, screw (dimethylthiocarbamoyl) monosulfide, screw (dibutyl thio carbamoyl) monosulfide, screw (dimethylthiocarbamoyl) disulfide, screw (dibutyl thio carbamoyl) disulfide, screw (diamyl thiocarbamoyl) disulfide, screw (dioctyl thio carbamoyl) disulfide, etc. can be mentioned preferably, for example.

[0030]

Furthermore, as a thio carver mate compound, the reactant of phosphorus pentasulfide and a pinene can be mentioned as a thio terpene compound, and dialkyl dithiocarbamic acid zinc can be mentioned for dilauryl thiodipropionate, distearyl thiodipropionate, etc. as a dialkyl thiodipropionate compound, for example. In these, the thiadiazole compound from points, such as an extreme pressure property, a friction property, and thermal oxidation stability, and benzyl sulfide are suitable.

[0031]

The desirable loadings of these frictions regulator are the range of 0.01 - 10 mass % on constituent whole-quantity criteria, and especially its range of 0.05 - 5 mass % is desirable. When loadings are under 0.01 mass %, even if the improvement effectiveness of the friction property by the synergistic effect with other components may be inadequate and loadings exceed 10 mass %, improvement in the effectiveness equivalent to loadings may not be found.

[0032]

(B) As a dispersant of a component, metal sulfonate, metal phenate, metallosalicylate, metal phosphonate, succinimid, etc. can be mentioned, for example.

The desirable loadings of these dispersants are the range of 0.01 - 10 mass % on constituent whole-quantity criteria, and especially its range of 0.5 - 5 mass % is desirable.

[0033]

As a rust-proofer of a component, for example (B) Dodecenyl succinic-acid half ester, Alkyl or alkenyl succinic-acid derivatives, such as an octadecenyl succinic-acid anhydride and a dodecenyl succinic-acid amide, Polyhydric-alcohol partial ester, such as sorbitan monooleate, glycerol monooleate, and pentaerythritol monooleate, calcium-petroleum sulfonate, calcium-alkyl benzene sulfonate, Ba-alkyl benzene sulfonate, Mg-alkyl benzene sulfonate, Na-alkyl benzene sulfonate, Zn-alkyl benzene sulfonate, Amines, such as metal sulfonate [, such as calcium-alkyl naphthalene sulfonate,], rosin amine, and N-oleyl ZARUKOSHIN, a dialkyl phosphite amine salt, etc. are usable.

The desirable loadings of these rust-proofers are the range of 0.01 - 5 mass % on constituent whole-quantity criteria, and especially its range of 0.05 - 2 mass % is desirable.

[0034]

(B) As a metal deactivator of a component, the compound of a benzotriazol system, a thiadiazole system, and a gallate system etc. is usable, for example.

The desirable loadings of these metal deactivators are 0.01 to 0.4 mass % on constituent whole-quantity criteria, and especially its range of 0.01 - 0.2 mass % is desirable.

(B) As a defoaming agent of a component, liquefied silicone is suitable, for example, methyl silicone, fluoro silicone, and polyacrylate are usable.

The desirable loadings of these defoaming agents are 0.0005 to 0.01 mass % on constituent whole-quantity criteria.

[0035]

(B) As a viscosity index improver of a component, olefine copolymers, such as poly alkyl methacrylate, poly alkyl styrene, polybutene, ethylene propylene rubber, a styrene-diene copolymer, and a styrene-maleic-anhydride ester copolymer, are usable.

The desirable loadings of these viscosity index improvers are 0.1 to 15 mass % on constituent whole-quantity criteria, and especially its range of 0.5 - 7 mass % is desirable.

[0036]

(B) As a thickening agent of a component, metal soap is desirable, for example, what is shown by the 12-hydronalium stearin acid Li metal salt, the 12-hydronalium stearin acid calcium metal salt, the 12-hydronalium stearin acid Na metal salt, or the following general formula (1) is mentioned.

(R-COO) n M x ... (1)

(Mx is elements, such as Na, Mg, aluminum, K, calcium, Li, Ti, Mn, Fe, Co, Nickel, Cu, and Zn, and R shows the alkyl group of carbon numbers 4-30, an alkyl aryl radical, an alkenyl radical, and an arylated alkyl radical.) n is the integer of 1-3.

(1) Set at a ceremony and it is Mx. What is Mg, aluminum, or Zn is desirable.

The desirable loadings of these thickening agents are 0.01 to 10 mass % on constituent whole-quantity criteria, and especially its range of 0.5 - 5 mass % is desirable.

[0037]

The lubricant constituent of this invention has the desirable kinematic viscosity in 40 degrees C in their being 6-16mm² / s, is especially desirable in their being 8-14mm² / s, and still more desirable in their being 10-14mm² / s.

Moreover, it is desirable in the flash point being 200 degrees C or more, still more desirable in it being 210 degrees C or more, desirable in the pour point being -35 degrees C or less, and still more desirable in it being -40 degrees C or less.

Furthermore, 80 degrees C under a thin film and the evaporation of 96 hours after are desirable in it being below 12 mass %, and it is still more desirable in it being below 4 mass %.

Though it is hypoviscosity, since it has the high flash point, and the above fluid lubrication agent and lubricant constituent of this invention cannot evaporate easily and are excellent in thermal resistance, they fit the oil impregnated sintered bearing oil or liquid bearing oil used for a high-speed motor etc.

[0038]

[Example]

Next, this invention is explained in more detail using an example.

In addition, the description of the base oil used in an example and the example of a comparison and the engine performance of an oilless bearing oil were measured as follows.

(1) Kinematic viscosity

It measured according to JIS K 2283.

(2) Total acid number

It measured according to the 5th term of JIS K 2501.

(3) Flash point

It measured according to JIS K 2265.

(4) Pour point

It measured according to JIS K 2269.

(5) Aniline point

It measured according to JIS K 2256. It dissolves in resin, rubber, etc. and is easy to make them swell, so that this value is low.

(6) Thin film residue trial (rate of residual oil)

the container shown in the lubricating oil heat stability test of JIS K 2540, and constant temperature -- 80 degrees C and the amount of residues of 96 hours were measured using the air bath, having used the amount of samples as 1g. It was expressed with the percentage and it considered as the rate of residual oil.

Moreover, the oils appearance of 96 hours after was observed, and the existence of an insoluble sludge was checked to oil.

In addition, air was continuously slushed 10l. / hr during measurement.

(7) Withstand-load sex test

Based on ASTM D 2783, it carried out on condition that rotational frequency 1,800rpm and a room temperature. It asked for the load abrasion index (LWI) from the maximum non-printing load (LNL) and the welding load (WL). Load carrying capacity is so good that this value is large.

(8) Abrasion resistant test

Based on ASTM D 2783, it carried out on 392 Ns of loads, rotational frequency 1,200rpm, the oil temperature of 80 degrees C, and the conditions for test time 60 minutes. The diameter of an average abrasion was computed by having averaged the diameter of an abrasion of three 1/2 inch balls.

[0039]

Examples 1-2 and the examples 1-4 of a comparison

As a fluid lubrication agent, [redacted] thing of the class shown in Table 1 was [redacted]pared, and the engine performance was evaluated. The result is shown in Table 1.

In addition, the commercial Polly alpha olefin of the inside of Table 1 and the example 1 of a comparison is a product made from Amoco, and a trade name. The commercial Polly alpha olefin of DURASYN162 and the example 2 of a comparison is a product made from Amoco, and a trade name. DURASYN164 was used.

[0040]

[Table 1]

表 1

	実施例1	実施例2	比較例1	比較例2	比較例3	比較例4
	ポリ- α -オレフィン (1-ドデセンの二 量体)	ポリ- α -オレフィン (1-テトラデセン の二量体)	市販ポリ- α -オレフィン (1-ドデセンの二量体)	市販ポリ- α -オレフィン (1-ドデセンの三量体)	市販ポリ- α -オレフィンの混合物 比較例1(40質量%) + 比較例2 (60質量%)	市販ポリ- α -オレフィンの混合物 比較例1(40質量%) + 比較例2 (60質量%)
動粘度(40°C)	(mm ² /s) 9.28	(mm ² /s) 12.9	(mm ² /s) 5.1	(mm ² /s) 16.9	(mm ² /s) 10.42	(mm ² /s) 11.54
動粘度(100°C)	(mm ² /s) 2.488	(mm ² /s) 3.22	(mm ² /s) 1.8	(mm ² /s) 3.9	(mm ² /s) 2.793	(mm ² /s) 3.22
引火点	(°C) 204(COC法)	(°C) 218(COC法)	(°C) 156(PM法)	(°C) 222(COC法)	(°C) 192(COC法)	(°C) 222(COC法)
全酸価	mg KOH/g 0.03	mg KOH/g 0.01	mg KOH/g 0.01	mg KOH/g 0.01	mg KOH/g 0.01	mg KOH/g 0.02
流動点	(°C) -45	(°C) -45	(°C) -50	(°C) -50	(°C) -50	(°C) -50
アニリン点	(°C) 108.3	(°C) 115.7	(°C) 90.6	(°C) 123.1	(°C) 115	(°C) 20
膜残さ試験(残油率 (質量%))	(質量%) 89.8	(質量%) 98.98	(質量%) 42.05	(質量%) 99.56	(質量%) 72.36	(質量%) 100

* COC in the flash point in Table 1 -- based on JIS K 2265, the PM method is applied for law and the PM method to the low thing of especially the flash point.

[0041]

Examples 3-9 and the example 5 of a comparison

(A) As the base oil (fluid lubrication agent) of a component, and an additive of the (B) component, the lubricant constituent using the component shown in Table 2 was prepared, and the description and engine performance were evaluated. The result is shown in Table 2.

[0042]

[Table 2]

表 2

	実施例3	実施例4	実施例5	実施例6	実施例7	実施例8	実施例9	比較例5
1-デセンの2量体								57.49
1-デセンの3量体								40
1-テトラデセンの2量体	98.99	97.99	97.99	98.94	97.94	97.49	96.99	
フェニル- α -ナフチルアミン	1	1	1	1	1	1	1	1
トリクレシルフオスフェート		1			1	1	1	
ハイドロジェンフオスファイト			1					1
リン酸エステルアミン塩				0.05	0.05			
ジ- ϵ -ニルホリサルファイト						0.5	0.5	
ステアリン酸								
Caスルホネート							0.5	
ベンゾトリアゾール								0.5
金属不活性化剤	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
動粘度(40°C)	12.6	13.1	13	12.6	13.2	13	13.1	10.54
動粘度(100°C)	3.221	3.225	3.225	3.222	3.225	3.224	3.226	2.783
引火点(COC法)	220	223	220	220	222	216	215	192
流動点	-45	-45	-45	-45	-45	-45	-45	-50
アニリン点	115.3	115.6	114.8	115.1	115	114.7	114.5	112
耐荷重性試験	142	176	381	288	365	408	402	288
耐摩耗性試験	0.68	0.54	0.42	0.46	0.43	0.53	0.4	0.49
薄膜残さ試験	99.25	99.06	99.08	99.06	99.01	99.05	99.03	72.25
外観	無	無	無	無	無	無	無	無
スラッジの有無	無	無	無	無	無	無	無	無

* The JI (monochrome) methyl acid phosphate amine salt of the friction regulator in Table 2 is the mixture of Monod object:G object =50:50 (mole ratio).

[0043]

[Effect of the Invention]

As explained to the detail above, it has the high flash point, and the fluid lubrication agent and lubricant constituent of this invention cannot evaporate easily, though it is hypoviscosity, and are excellent in thermal resistance. For this reason, it is useful to the oil impregnated sintered bearing oil or liquid bearing oil used for a high-speed motor etc.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention]

About a fluid lubrication agent, a lubricating oil constituent, and a bearing oil, it has the high flash point and especially this invention cannot evaporate easily, though it is hypoviscosity, and it relates to the fluid lubrication agent which is excellent in thermal resistance, a lubricant constituent, and a bearing oil.

[0002]

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PRIOR ART

[Description of the Prior Art]

The spindle motor used for an electrical machinery and apparatus especially CD, DVD and HDD, a polygon scanner, etc. is accelerated every year, and current requires high-speed rotation of 10000 or more rpm increasingly.

Although anti-friction bearing represented by the ball bearing has been conventionally used for these spindle motors, the dynamic pressure liquid bearing of a non-contact mold and the oil impregnated sintered bearing of low cost are increasingly used from the engine performance and a cost side. The engine performance at the time of high-speed rotation of these dynamic pressure liquid bearing and an oil impregnated sintered bearing (mainly running torque) becomes settled with the viscosity of the lubricant used in many cases, and the running torque at the time of high-speed rotation tends to become low, so that it is hypoviscosity.

On the other hand, once these lubricant is enclosed with a bearing device, in order to have to maintain whole life lubricity in the condition that there is no supply, the evaporation loss of lubricant and decomposition loss must be avoided as much as possible.

It is difficult for an evaporation loss to also increase from hydrocarbon-group oil represented by usual mineral oil, if it hypoviscosity-izes (low molecular weight), and to be compatible in hypoviscosity-izing and low evaporation-ization. Moreover, aiming at this coexistence, the technique using the ester which is a polar compound is indicated by base oil (JP,11-172267,A, JP,2001-240885,A, JP,2002-146374,A, etc.).

[0003]

However, if a polar substance like ester is used, deformation and the fault of making it discolor will generate components, such as cladding materials, such as various resin material, for example, CD, and a DVD disk, and a motor frame. For CD and DVD which record especially with a lightwave signal, covering resin must bloom cloudy optically or must avoid deforming as much as possible.

Since it is such, the ester system oils which are excellent as a property also have the environment which cannot carry out real use. On the other hand, vaporization is lower than the former to mineral oil in the motor vessel which uses many CDs, DVDs, and resin material, and the lubricant which made base oil the Polly alpha olefin which is excellent in thermal resistance has been used for it.

However, since it corresponds to improvement in the speed of a motor, hypoviscosity-ization of base oil accelerates and that whose kinematic viscosity in 40 degrees C is 10mm² / s grade is increasingly called for at the present in recent years. The Polly alpha olefin marketed as base oil is the oligomer of 1-decene, and viscosity is decided by the polymerization degree. Kinematic viscosity [in / in the Polly alpha olefin of a dimer with the lowest polymerization degree / 40 degrees C] is about 5mm² / s, and kinematic viscosity [in / in the Polly alpha olefin of the trimer on it / 40 degrees C] is about 17mm² / s. Therefore, if it is going to prepare the fluid lubrication agent whose kinematic viscosity in 40 degrees C is 10mm² / s, it will become the blend with 5mm² / s, and 17mm² / s inevitably. In this case, although target kinematic viscosity is attained, since the Polly alpha olefin of a dimer tends to have evaporated, there was a problem that the amount of loss of lubricant increased as compared with the mineral oil of this viscosity.

[0004]

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EFFECT OF THE INVENTION

[Effect of the Invention]

As explained to the detail above, it has the high flash point, and the fluid lubrication agent and lubricant constituent of this invention cannot evaporate easily, though it is hypoviscosity, and are excellent in thermal resistance. For this reason, it is useful to the oil impregnated sintered bearing oil or liquid bearing oil used for a high-speed motor etc.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]

This invention was made in order to solve the aforementioned technical problem, though it is hypoviscosity, it has the high flash point and it cannot evaporate easily, and it aims at offering the fluid lubrication agent which is excellent in thermal resistance, a lubricant constituent and an oil impregnated sintered bearing oil, or a liquid bearing oil.

[0005]

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MEANS

[Means for Solving the Problem]

In order to attain said purpose, as a result of repeating research wholeheartedly, this invention persons are setting the raw material of the Polly alpha olefin not only to 1-decene (C(carbon number) 10) but to C12 (1-dodecen) and C14 (1-tetra-decene), and carrying out the polymerization of these, and realized the middle molecular weight and the middle viscosity fluid of lubricant of a commercial item. Header this invention is completed for the ability of the oil impregnated sintered bearing oil or liquid bearing oil using the lubricant constituent and it which are excellent in hypoviscosity, low vaporization, thermal resistance, and lubricity to be offered by excelling mineral oil in vaporization and thermal resistance, and being able to offer the fluid lubrication agent of hypoviscosity with few evaporation losses than the blend preparation liquid of a commercial item (1-decene oligomer) by this, and blending various additives by making this lubricant into base oil further.

[0006]

Namely, this invention,

The fluid lubrication agent 180 degrees C or more and whose pour point it consists of a hydrocarbon of carbon numbers 21-29, and below 4.9mm² / s, and the flash point are [the kinematic viscosity in 40 degrees C] -15 degrees C or less for 6-16mm² / s, and the kinematic viscosity in 100 degrees C,

(A) In the lubricant constituent and list in which it becomes from the hydrocarbon of carbon numbers 21-29, and the kinematic viscosity in 40 degrees C comes at least to blend a kind of additive chosen as the fluid lubrication agent 180 degrees C or more and whose pour point 4.9 or less and the flash point are -15 degrees C or less for 6-16mm² / s, and the kinematic viscosity in 100 degrees C from the (B) antioxidant, a friction regulator, a dispersant, a rust-proofer, a metal deactivator, a defoaming agent, a viscosity index improver, and a thickening agent The oil impregnated sintered bearing oil or liquid bearing oil which consists of said fluid lubrication agent or said lubricant constituent is offered.

[0007]

[Embodiment of the Invention]

The fluid lubrication agent of this invention consists of a hydrocarbon of carbon numbers 21-29, and, for 6-16mm² / s, and the kinematic viscosity in 100 degrees C, the flash point is [the kinematic viscosity in 40 degrees C / 180 degrees C or more and the pour point] -15 degrees C or less below 4.9mm² / s.

It is desirable in it being the oligomer more than at least one kind of dimer chosen from 1-alkenes of carbon numbers 4-24 as a hydrocarbon of said carbon numbers 21-29 in the fluid lubrication agent of this invention, and it is desirable especially when chosen out of 1-alkenes of carbon numbers 12-14.

As 1-alkenes, for example 1-butene, 1-pentene, 1-hexene, 1-heptene, 1-octene, 1-nonene, 1-decene, 1-dodecen, 1-tetra-decene, 1-hexa decene, 1-heptadecene, 1-octadecene, 1-nonadecen, 1-ray KOSEN, 1-HENEIKOSEN, 1-DOKOSEN, 1-TORIKOSEN, 1-tetra-KOSEN, 1-pen TAKOSEN, 1-hexa KOSEN, 1-hepta-KOSEN, 1-OKUTAKOSEN, 1-nona KOSEN, etc. are mentioned. Also in these 1-dodecen and 1-tetra-decene are especially desirable.

[0008]

The kinematic viscosity in 40 degrees C is below $4.9\text{mm}^2/\text{s}$, and has [the fluid lubrication agent of this invention / $6\text{--}16\text{mm}^2/\text{s}$, and the kinematic viscosity in 100 degrees C / the kinematic viscosity in 40 degrees C] $10\text{--}14\text{mm}^2/\text{s}$, and the desirable kinematic viscosity in 100 degrees C in their being below $4\text{mm}^2/\text{s}$. The fluid lubrication agent of this invention is because it aims at considering as hypoviscosity.

The fluid lubrication agent of this invention is desirable in the flash point being 180 degrees C or more, and it being 200 degrees C or more. The flash point is because it is inferior to vaporization or thermal resistance in it being less than 180 degrees C.

The fluid lubrication agent of this invention is desirable in the pour point being -15 degrees C or less, and it being -35 degrees C or less. If the pour point exceeds -15 degrees C, the viscous drag at the time of low temperature will have a bad influence on increase, and the startability of a motor and actuation.

80 degrees C under a thin film and the evaporation of 96 hours after are desirable in it being below 12 mass %, and that of the fluid lubrication agent of this invention are still more desirable in it being below 4 mass %.

[0009]

The lubricant constituent of this invention comes at least to blend a kind of additive chosen as the (A) aforementioned fluid lubrication agent from the (B) antioxidant, a friction regulator, a dispersant, a rust-proofer, a metal deactivator, a defoaming agent, a viscosity index improver, and a thickening agent.

[0010]

(A) The component is the same as that of the fluid lubrication agent of this invention mentioned above.

(B) As an antioxidant of a component, an amine system antioxidant, a phenolic antioxidant, a sulfur system compound, etc. are mentioned.

As an amine system anti-oxidant, for example A mono-octyl diphenylamine, Monoalkyl diphenylamine systems, such as a mono-nonyl diphenylamine, - dibutyl diphenylamine, and 4 and 4'4, 4'-dipentyl diphenylamine, A 4 and 4'-dihexyl diphenylamine, 4,4'-diheptyl diphenylamine, Dialkyl diphenylamine systems, such as - dioctyl diphenylamine, and 4 and 4'4, 4'-dinonylphenylamine, A tetrabutyl diphenylamine, a tetra-hexyl diphenylamine, The poly alkyl diphenylamine systems, such as a tetra-octyl diphenylamine and a tetra-nonyl diphenylamine, alpha-naphthylamine, a phenyl-alpha-naphthylamine, a buthylphenyl-alpha-naphthylamine, A pentyl phenyl-alpha-naphthylamine, a hexyl phenyl-alpha-naphthylamine, Naphthylamine systems, such as a heptyl phenyl-alpha-naphthylamine, an octyl phenyl-alpha-naphthylamine, and a nonylphenyl-alpha-naphthylamine, can be mentioned, and the thing of a dialkyl diphenylamine system is desirable especially. The above-mentioned amine system antioxidant may be used combining a kind or two sorts or more.

[0011]

As a phenolic antioxidant, diphenol systems, such as - methylenebis (2, 6-G tert-butylphenol), and mono-phenol system [, such as 2, 6-G tert-butyl-4-methyl phenol, 2, 6-G tert-butyl-4-ethylphenol 2 and 6-G tert-butyl-p-cresol,], 4, and 4'2, 2'-methylenebis (4-ethyl-6-tert-butylphenol), can be mentioned, for example. The above-mentioned phenolic antioxidant may be used combining a kind or two sorts or more.

As a sulfur system compound, phenothiazin, pentaerythritol-tetrakis - (3-laurylthio propionate), A screw (3, 5-tert-butyl-4-hydroxybenzyl) sulfide, A thio diethylene screw (3- (3, 5-G tert-butyl-4-hydroxyphenyl)) propionate, 2, and 6-G tert-butyl-4-(4, 6-screw (octylthio)-1,3,5-triazine-2-methylamino) phenol etc. is mentioned.

The desirable loadings of these antioxidants are the range of 0.01 - 10 mass % on constituent whole-quantity criteria, and especially its range of 0.03 - 5 mass % is desirable.

[0012]

(B) As an oily agent of a component, aliphatic series saturation, partial saturation monocarboxylic acid amides, etc., such as aliphatic series saturation, such as aliphatic series saturation, such as hydroxyfatty acid, such as polymerization fatty acids, such as aliphatic series saturation, such as

stearin acid and oleic acid, partial saturation monocarboxylic acid, dimer acid, and hydrogenation dimer acid, ricinoleic acid, and 12-hydroxy stearin acid, lauryl alcohol, and oleyl alcohol, and partial saturation monoalcohol, a stearyl amine, and an oleyl amine, and partial saturation monoamine, a lauric-acid amide, and oleic amide, are mentioned.

The desirable loadings of these oiliness agent are the range of 0.01 - 10 mass % on constituent whole-quantity criteria, and especially its range of 0.1 - 5 mass % is desirable.

[0013]

(B) What is generally used as an oily agent or an extreme pressure agent can be used for the friction regulator of a component, and the amine salt and sulfur system extreme pressure agent of phosphoric ester and phosphoric ester are mentioned especially.

As phosphoric ester, the phosphoric ester and alkyl acid phosphate which are expressed with following general formula (I) - (V), phosphite, and acid phosphite are included.

[0014]

[Formula 1]



[0015]

The above-mentioned general formula (I) It sets to - (V) and is R1 -R3. The alkyl group, the alkenyl radical, alkyl aryl radical, and arylated alkyl radical of carbon numbers 4-30 are shown, and it is R1 -R3. You may differ, even if the same.

As phosphoric ester, thoria reel phosphate, trialkyl phosphate, Trialkyl aryl phosphate, thoria reel alkyl phosphate, There is trialkenyl phosphate etc. For example, triphenyl phosphate, Tricresyl phosphate, benzyl diphenyl phosphate, ethyl diphenyl phosphate, Tributyl phosphate, ethyl dibutyl phosphate, cresyl diphenyl phosphate, Dicresyl phenyl phosphate, ethyl phenyl diphenyl phosphate, Diethyl phenyl phenyl phosphate, propyl phenyl diphenyl phosphate, Dipropyl phenyl phenyl phosphate, triethyl phenyl phosphate, TORIPURO pill phenyl phosphate, buthylphenyl diphenyl phosphate, Dibutyl phenyl phenyl phosphate, tributyl phenyl phosphate, Trihexyl phosphate, Tori (2-ethylhexyl) phosphate, Tridecyl phosphate, trilauryl phosphate, TORIMIRISU chill phosphate, tripalmityl phosphate, tris TEARIRU phosphate, trio rail phosphate, etc. can be mentioned.

[0016]

As alkyl acid phosphate, 2-ethylhexyl acid phosphate, ethyl acid phosphate, butyl acid phosphate, oleyl acid phosphate, tetra-KOSHIRU acid phosphate, isodecylacidphosphate, lauryl acid phosphate, tridecyl acid phosphate, stearyl acid phosphate, isostearylacidphosphate, etc. can be mentioned, for example.

[0017]

As phosphite, triethyl phosphite, tributyl phosphite, triphenyl phosphite, tricresyl phosphite, Tori (nonylphenyl) phosphite, Tori (2-ethylhexyl) phosphite, tridecyl phosphite, trilauryl phosphite, tri-iso-octyl phosphite, diphenyl isodecyl phosphite, tristearylphosphite, trioylel phosphite, etc. can be mentioned, for example.

[0018]

As acid phosphite, dibutyl hydrogen phosphite, dilauryl hydrogen phosphite, dioleyl hydrogen phosphite, distearyl hydrogen phosphite, diphenyl hydrogen phosphite, etc. can be mentioned, for example. In the above phosphoric ester, tricresyl phosphate and triphenyl phosphate are suitable.

[0019]

Furthermore, as amines which form these and an amine salt, it is a general formula (VI), for example.

$R_4nNH_3-n \dots$ (VI)

(R4 shows the alkyl group of carbon numbers 3-30 or an alkenyl radical, the aryl group of carbon numbers 6-30, an arylated alkyl radical, or the hydroxyalkyl radical of carbon numbers 2-30 among a formula, and n shows 1, 2, or 3.) Moreover, R4 When there are more than one, it is two or more R4. Even if the same, you may differ.

It comes out and the mono-permutation amine, JI permutation amine, or the Tori permutation amine expressed is mentioned. R4 in the above-mentioned general formula (VI) Inner alkyl groups or alkenyl radicals of carbon numbers 3-30 may be the shape of a straight chain, a letter of branching, and annular any.

[0020]

As an example of a mono-permutation amine, a butylamine, pentylamine, hexylamine, Cyclohexylamine, an octyl amine, a lauryl amine, a stearyl amine, an oleyl amine, benzylamine, etc. can be mentioned. As an example of a JI permutation amine Dibutyl amine, dipentylamine, a dihexyl amine, dicyclohexylamine, A dioctyl amine, a dilauryl amine, a distearyl amine, a dioleoyl amine, Dibenzylamine, stearyl monoethanolamine, DESHIRU monoethanolamine, Hexyl mono-propanolamine, benzyl monoethanolamine, Phenyl monoethanolamine, tolyl mono-propanol, etc. can be mentioned. As an example of the Tori permutation amine Tributylamine, tripentylamine, trihexyl amine, tricyclo hexylamine, Trioctylamine, trilaurylamine, TORISUTE allylamine, A trio rail amine, tribenzylamine, dioleoyl monoethanolamine, Dilauryl mono-propanolamine, dioctyl monoethanolamine, Dihexyl mono-propanolamine, dibutyl mono-propanolamine, Oleyl diethanolamine, stearyl dipropanolamine, Lauryl diethanolamine, octyl dipropanolamine, Butyl

diethanolamine, benzyl diethanolamine, phenyl diethanolamine, tolyl diethanolamine, xylyl diethanolamine, triethanolamine, tripropanolamine, etc. can be mentioned.

[0021]

What is necessary is to have a sulfur atom in intramolecular, to distribute to lubricating oil base oil as a sulfur system extreme pressure agent, at the dissolution or homogeneity, and just to be able to demonstrate an extreme pressure property and the outstanding friction property. As such a thing, sulfurized oil fat, a sulfuration fatty acid, sulfuration ester, a sulfuration olefin, dihydrocull BIRUPORISARUFAIDO, a thiadiazole compound, thiophosphoric acid ester (a thio FOSU fight, thio phosphate), an alkylthio carbamoyl compound, a thio carver mate compound, a thio terpene compound, a dialkyl thiodipropionate compound, etc. can be mentioned, for example. Although sulfurized oil fat makes sulfur, a sulfur content compound, and fats and oils (lard oil, whale oil, vegetable oil, fish oil, etc.) react, it is obtained here and especially a limit does not have the sulfur content, generally the thing of 5 - 30 mass % is suitable. As the example, sulfuration lard, sulfuration rapeseed oil, sulfuration castor oil, sulfuration soybean oil, sulfuration rice bran oil, etc. can be mentioned. Sulfuration oleic acid etc. can be mentioned as an example of a sulfuration fatty acid, and sulfuration methyl oleate, sulfuration rice bran fatty-acid octyl, etc. can be mentioned as an example of sulfuration ester.

[0022]

As a sulfuration olefin, it is the following general formula (VII), for example.

R5-Sa-R6 ... (VII)

(R5 shows the alkenyl radical of carbon numbers 2-15 among a formula, R6 shows the alkyl group or alkenyl radical of carbon numbers 2-15, and a shows the integer of 1-8.)

It can come out and the compound expressed can be mentioned. This compound is obtained by making the olefin of carbon numbers 2-15, or that 2 - a tetramer react with sulfidizing agents, such as sulfur and a sulfur chloride, and a propylene, isobutene, its JIISO butene, etc. are desirable as this olefin.

[0023]

As dihydrocull BIRUPORISARUFAIDO, it is the following general formula (VIII).

R7-Sb-R8 ... (VIII)

(R7 and R8 show the aryl group of the alkyl group of carbon numbers 1-20 or an annular alkyl group, and carbon numbers 6-20, the alkyl aryl radical of carbon numbers 7-20, or the arylated alkyl radical of carbon numbers 7-20 among a formula, respectively, even if they are mutually the same, you may differ, and b shows the integer of 1-8.)

It is the compound come out of and expressed. Here, it is R7. And R8 It is called an alkyl sulfide when it is an alkyl group.

[0024]

R7 in the above-mentioned general formula (VIII) And R8 A methyl group, an ethyl group, n-propyl group, an isopropyl group, n-butyl, an isobutyl radical, sec-butyl, tert-butyl, various pentyl radicals, various hexyl groups, various heptyl radicals, various octyl radicals, various nonyl radicals, various decyl groups, various dodecyl, a cyclohexyl radical, a cyclo octyl radical, a phenyl group, a naphthyl group, a tolyl group, a xylyl group, benzyl, a phenethyl radical, etc. can be mentioned.

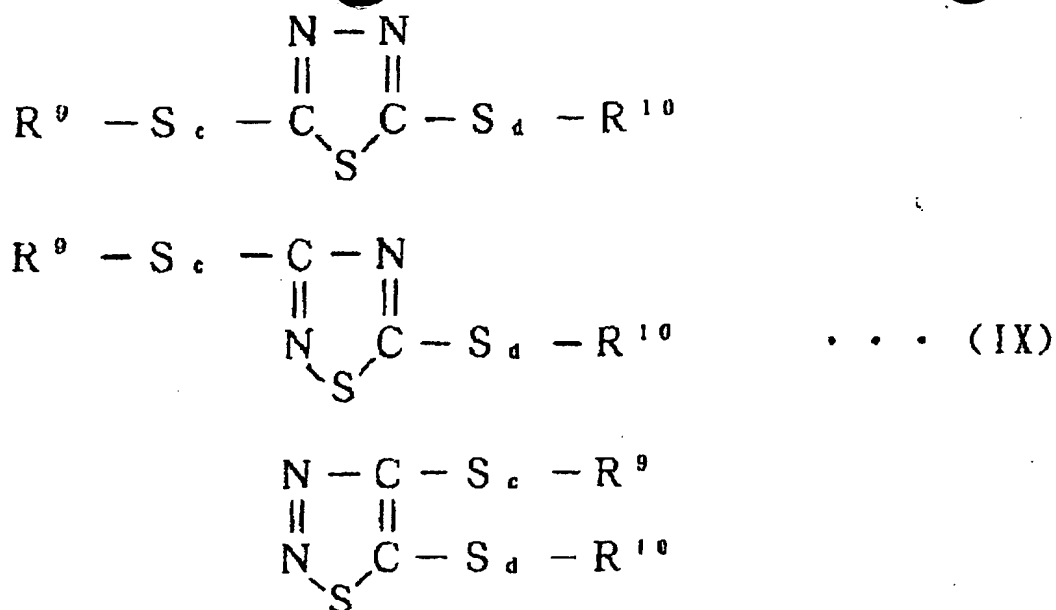
[0025]

As this dihydrocull BIRUPORISARUFAIDO, dibenzyl polysulfide, various dinonyl polysulfide, various didodecyl polysulfide, various dibutyl polysulfide, various dioctyl polysulfide, diphenyl polysulfide, dicyclohexyl polysulfide, etc. can be mentioned preferably, for example.

[0026]

As a thiadiazole compound, it is the following general formula (IX), for example.

[Formula 2]



[0027]

(R9 and R10 show a hydrogen atom and the hydrocarbon group of carbon numbers 1-20 among a formula, respectively, and c and d show the integer of 0-8, respectively.)

It comes out and 1 expressed, 3, 4-thiadiazole, 1 and 2, 4-thiadiazole compound, 1 and 4, 5-thiadiazole, etc. are used preferably.

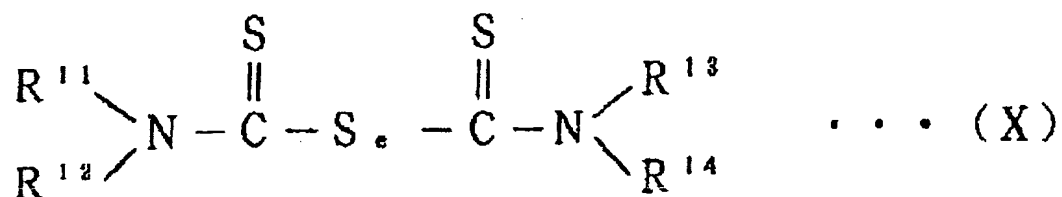
As this thiadiazole compound, it is 2 and 5-screw (n-hexyl dithio), for example. - 1, 3, 4-thiadiazole, 2, 5-screw (n-octyl dithio) - 1, 3, 4-thiadiazole, 2, 5-screw (n-nonyl dithio) - 1, 3, 4-thiadiazole, 2, 5-screw (1, 1, 3, 3, - tetramethylbutyl dithio) - 1, 3, 4-thiadiazole, 3, 5-screw (n-hexyl dithio) - 1, 2, 4-thiadiazole, 3, 5-screw (n-octyl dithio) - 1, 2, 4-thiadiazole, 3, 5-screw (n-nonyl dithio) - 1, 2, 4-thiadiazole, 3, 5-screw (1, 1, 3, 3, - tetramethylbutyl dithio) - 1, 2, 4-thiadiazole, 4, 5-screw (n-hexyl dithio) - 1, 2, 3-thiadiazole, 4, 5-screw (n-octyl dithio) - 1, 2, 3-thiadiazole, 4, 5-screw (n-nonyl dithio) - 1, 2, 3-thiadiazole, 4, 5-screw (1, 1, 3, 3, - tetramethylbutyl dithio) - 1, 2, and 3-thiadiazole etc. can be mentioned preferably.

[0028]

As thiophosphoric acid ester, an alkyl TORICHIOFOSU fight, aryl or alkyl aryl thio phosphate, dialkyl dithiophosphate zinc, etc. are mentioned, and a lauryl TORICHIOFOSU fight and triphenyl thio phosphate are especially desirable.

As an alkylthio carbamoyl compound, it is the following general formula (X), for example.

[Formula 3]



[0029]

(R11-R14 show the alkyl group of carbon numbers 1-20 among a formula, respectively, and e

shows the integer of 1-8.)

As this alkylthio carbamoyl compound, screw (dimethylthiocarbamoyl) monosulfide, screw (dibutyl thio carbamoyl) monosulfide, screw (dimethylthiocarbamoyl) disulfide, screw (dibutyl thio carbamoyl) disulfide, screw (diamyl thiocarbamoyl) disulfide, screw (dioctyl thio carbamoyl) disulfide, etc. can be mentioned preferably, for example.

[0030]

Furthermore, as a thio carver mate compound, the reactant of phosphorus pentasulfide and a pinene can be mentioned as a thio terpene compound, and dialkyl dithiocarbamic acid zinc can be mentioned for dilauryl thiodipropionate, distearyl thiodipropionate, etc. as a dialkyl thiodipropionate compound, for example. In these, the thiadiazole compound from points, such as an extreme pressure property, a friction property, and thermal oxidation stability, and benzyl sulfide are suitable.

[0031]

The desirable loadings of these frictions regulator are the range of 0.01 - 10 mass % on constituent whole-quantity criteria, and especially its range of 0.05 - 5 mass % is desirable. When loadings are under 0.01 mass %, even if the improvement effectiveness of the friction property by the synergistic effect with other components may be inadequate and loadings exceed 10 mass %, improvement in the effectiveness equivalent to loadings may not be found.

[0032]

(B) As a dispersant of a component, metal sulfonate, metal phenate, metallosalicylate, metal phosphonate, succinimid, etc. can be mentioned, for example.

The desirable loadings of these dispersants are the range of 0.01 - 10 mass % on constituent whole-quantity criteria, and especially its range of 0.5 - 5 mass % is desirable.

[0033]

As a rusr-proofer of a component, for example (B) Dodecenyl succinic-acid half ester, Alkyl or alkenyl succinic-acid derivatives, such as an octadecenyl succinic-acid anhydride and a dodecenyl succinic-acid amide, Polyhydric-alcohol partial ester, such as sorbitan monooleate, glycerol monooleate, and pentaerythritol monooleate, calcium-petroleum sulfonate, calcium-alkyl benzene sulfonate, Ba-alkyl benzene sulfonate, Mg-alkyl benzene sulfonate, Na-alkyl benzene sulfonate, Zn-alkyl benzene sulfonate, Amines, such as metal sulfonate [, such as calcium-alkyl naphthalene sulfonate,], rosin amine, and N-oleyl ZARUKOSHIN, a dialkyl phosphite amine salt, etc. are usable.

The desirable loadings of these rusr-proofers are the range of 0.01 - 5 mass % on constituent whole-quantity criteria, and especially its range of 0.05 - 2 mass % is desirable.

[0034]

(B) As a metal deactivator of a component, the compound of a benzotriazol system, a thiadiazole system, and a gallate system etc. is usable, for example.

The desirable loadings of these metal deactivators are 0.01 to 0.4 mass % on constituent whole-quantity criteria, and especially its range of 0.01 - 0.2 mass % is desirable.

(B) As a defoaming agent of a component, liquefied silicone is suitable, for example, methyl silicone, fluoro silicone, and polyacrylate are usable.

The desirable loadings of these defoaming agents are 0.0005 to 0.01 mass % on constituent whole-quantity criteria.

[0035]

(B) As a viscosity index improver of a component, olefine copolymers, such as poly alkyl methacrylate, poly alkyl styrene, polybutene, ethylene propylene rubber, a styrene-diene copolymer, and a styrene-maleic-anhydride ester copolymer, are usable.

The desirable loadings of these viscosity index improvers are 0.1 to 15 mass % on constituent whole-quantity criteria, and especially its range of 0.5 - 7 mass % is desirable.

[0036]

(B) As a thickening agent of a component, metal soap is desirable, for example, what is shown by the 12-hydranalium stearin acid Li metal salt, the 12-hydranalium stearin acid calcium metal salt, the 12-hydranalium stearin acid Na metal salt, or the following general formula (1) is mentioned.

(R-COO) n Mx ... (1)

(Mx is elements, such as Na, Mg, aluminum, K, calcium, Li, Ti, Mn, Fe, Co, nickel, Cu, and Zn, and R shows the alkyl group of carbon numbers 4-30, an alkyl aryl radical, an alkenyl radical, and an arylated alkyl radical.) n is the integer of 1-3.

(1) Set at a ceremony and it is Mx. What is Mg, aluminum, or Zn is desirable.

The desirable loadings of these thickening agents are 0.01 to 10 mass % on constituent whole-quantity criteria, and especially its range of 0.5 - 5 mass % is desirable.

[0037]

The lubricant constituent of this invention has the desirable kinematic viscosity in 40 degrees C in their being 6-16mm² / s, is especially desirable in their being 8-14mm² / s, and still more desirable in their being 10-14mm² / s.

Moreover, it is desirable in the flash point being 200 degrees C or more, still more desirable in it being 210 degrees C or more, desirable in the pour point being -35 degrees C or less, and still more desirable in it being -40 degrees C or less.

Furthermore, 80 degrees C under a thin film and the evaporation of 96 hours after are desirable in it being below 12 mass %, and it is still more desirable in it being below 4 mass %.

Though it is hypoviscosity, since it has the high flash point, and the above fluid lubrication agent and lubricant constituent of this invention cannot evaporate easily and are excellent in thermal resistance, they fit the oil impregnated sintered bearing oil or liquid bearing oil used for a high-speed motor etc.

[0038]

[Translation done.]

* NOTICES *

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

EXAMPLE

[Example]

Next, this invention is explained in more detail using an example.

In addition, the description of the base oil used in an example and the example of a comparison and the engine performance of an oilless bearing oil were measured as follows.

(1) Kinematic viscosity

It measured according to JIS K 2283.

(2) Total acid number

It measured according to the 5th term of JIS K 2501.

(3) Flash point

It measured according to JIS K 2265.

(4) Pour point

It measured according to JIS K 2269.

(5) Aniline point

It measured according to JIS K 2256. It dissolves in resin, rubber, etc. and is easy to make them swell, so that this value is low.

(6) Thin film residue trial (rate of residual oil)

the container shown in the lubricating oil heat stability test of JIS K 2540, and constant temperature -- 80 degrees C and the amount of residues of 96 hours were measured using the air bath, having used the amount of samples as 1g. It was expressed with the percentage and it considered as the rate of residual oil.

Moreover, the oils appearance of 96 hours after was observed, and the existence of an insoluble sludge was checked to oil.

In addition, air was continuously slushed 10l. / hr during measurement.

(7) Withstand-load sex test

Based on ASTM D 2783, it carried out on condition that rotational frequency 1,800rpm and a room temperature. It asked for the load abrasion index (LWI) from the maximum non-printing load (LNL) and the welding load (WL). Load carrying capacity is so good that this value is large.

(8) Abrasion resistant test

Based on ASTM D 2783, it carried out on 392 Ns of loads, rotational frequency 1,200rpm, the oil temperature of 80 degrees C, and the conditions for test time 60 minutes. The diameter of an average abrasion was computed by having averaged the diameter of an abrasion of three 1/2 inch balls.

[0039]

Examples 1-2 and the examples 1-4 of a comparison

As a fluid lubrication agent, the thing of the class shown in Table 1 was prepared, and the engine performance was evaluated. The result is shown in Table 1.

In addition, the commercial Polly alpha olefin of the inside of Table 1 and the example 1 of a comparison is a product made from Amoco, and a trade name. The commercial Polly alpha olefin of DURASYN162 and the example 2 of a comparison is a product made from Amoco, and a trade name. DURASYN164 was used.

[0040]

[Table 1]

表 1

	実施例1	実施例2	比較例1	比較例2	比較例3	比較例4
	ポリ- α -オレフィン (1-ドデセンの二 量体)	ポリ- α -オレフィン (1-テトラデセン の二量体)	市販ポリ- α -オレフィン (1-ドデセンの二量体)	市販ポリ- α -オレフィン (1-ドデセンの三量体)	市販ポリ- α -オレフィンの混合物 比較例1(40質量%) + 比較例2 (60質量%)	市販ポリ- α -オレフィンの混合物 比較例1(40質量%) + 比較例2 (60質量%)
動粘度(40°C)	(mm ² /s)	9.28	12.9	5.1	16.9	10.42
動粘度(100°C)	(mm ² /s)	2.488	3.22	1.8	3.9	2.793
引火点	(°C)	204(COC法)	218(COC法)	156(PM法)	222(COC法)	192(COC法)
全酸価	mg KOH/g	0.03	0.01	0.01	0.01	0.01
流動点	(°C)	-45	-45	-50	-50	-50
アニリン点	(°C)	108.3	115.7	90.6	123.1	115
膜残さ試験(残油率)	(質量%)	89.8	98.98	42.05	99.56	72.36
						100

* COC in the flash point in Table 1 -- based on JIS K 2265, the PM method is applied for law and the PM method to the low thing of especially the flash point.

[0041]

Examples 3-9 and the example 5 of a comparison

(A) As the base oil (fluid lubrication agent) of a component, and an additive of the (B) component, the lubricant constituent using the component shown in Table 2 was prepared, and the description and engine performance were evaluated. The result is shown in Table 2.

[0042]

[Table 2]

表 2

	実施例3	実施例4	実施例5	実施例6	実施例7	実施例8	実施例9	比較例5
1-デセンの2量体								57.49
1-デセンの3量体								40
1-テトラデセンの2量体	98.99	97.99	97.99	98.94	97.94	97.49	96.99	
フェニル- α -ナフチルアミン	1	1	1	1	1	1	1	1
トリクレシルフォスフェート		1			1	1	1	
ハイドロジェンフォスファイト			1					1
リン酸エステルアミン塩				0.05	0.05			
ジセーニルポリサルファイト						0.5	0.5	
ステアリン酸							0.5	
Caスルホネート								0.5
ベンゾトリアゾール								
組成物の性状	金属不活性化剤	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	動粘度(40°C)	12.6	13.1	13	12.6	13.2	13	13.1
	動粘度(100°C)	3.221	3.225	3.225	3.222	3.225	3.224	3.226
	引火点(COC法)	220	223	220	220	222	216	215
	流動点	-45	-45	-45	-45	-45	-45	-50
	アニン点	115.3	115.6	114.8	115.1	115	114.7	114.5
	LWI	142	176	381	288	365	408	288
耐荷重性試験								
耐摩耗性試験								
薄膜残さ試験								
外観	スラッジの有無	無	無	無	無	無	無	無

* The JI (monochrome) methyl acid phosphate amine salt of the friction regulator in Table 2 is the mixture of Monod object:G object =50:50 (mole ratio).

[0043]

[Translation done.]